VieBOP: Extending BPEL Engines with BPEL4People

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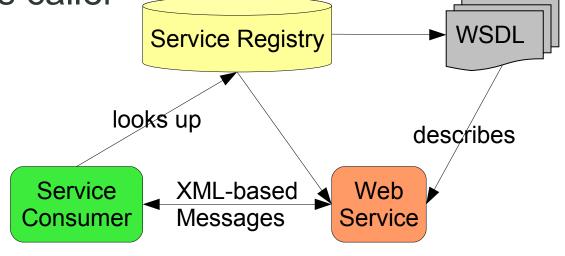DISTRIBUTED SYSTEMS GROUP

Outline

- Introduction to Web Services & BPEL
- Human-Process Integration
- BPEL4People Actors & Scenarios
- VieBOP architecture & components
- Summary & Further Work

Web Services

- de-facto standard for distributed applications
- maximum interoperability
- open & flexible architecture
- complexity & implementation can be hidden towards caller

Business Process Execution Language (BPEL)

- Layered on top of Web Services
- de-facto standard for Web Service orchestration
- external activities correspond to Web Services
- BPEL processes invokable as Web Services

```xml
<process name="ExampleProcess"
         targetNamespace="http://example.bpel.vitalab.tuwien.ac.at/process/"
         xmlns="http://docs.oasis-open.org/wsbpel/2.0/process/executable/">

  <partnerLinks>
     ...
  </partnerLinks>

  <variables>
     ...
  </variables>

  <sequence>
     ...
  </sequence>
   ...
</process>
```

Business Process Execution Language (BPEL)
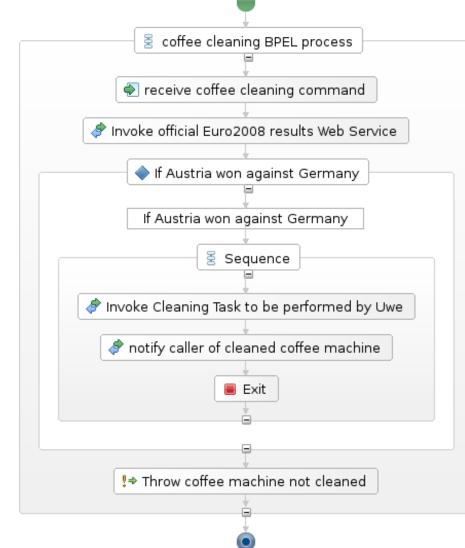
Workflow-language

- evolved out of XLANG & WSFL

Basic Activities
```
receive
reply
invoke
assign
throw
wait
empty
```

Structured Activities
```
sequence
flow
while
switch
pick
```

BPEL & Human Interaction

coffee cleaning BPEL process

→ receive coffee cleaning command

Invoke official Euro2008 results Web Service

◆ If Austria won against Germany

If Austria won against Germany

Sequence

Invoke Cleaning Task to be performed by Uwe

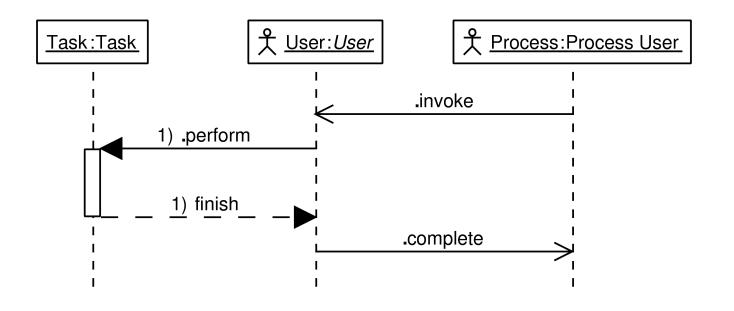notify caller of cleaned coffee machine

■ Exit

!→ Throw coffee machine not cleaned

Human ↔ Process Interaction

- Process invoking a containing human task

Human ↔ Processes Integration

- no direct support for human tasks within BPEL
  - invocation of external activities via Web Service calls
  - Web Service encapsulates/"implements" a human task
- no formalisation between process stakeholders, processes and human tasks
  - authorisation, authentication?
  - notification?
- no implicit task ownership management

=> **need for integration** of human interaction scenarios into BPEL processes

BPEL Extensibility

- `<extensionActivity>`
- `<extensionAssignOperation>`
- `mustUnderstand` Attribute for BPEL engines

```
<process>
  ...
 <extensions>
   <extension namespace="http://xml.vitalab.tuwien.ac.at/ns/viebop/1.0"
              mustUnderstand="yes" />
   ...
 </extensions>
  ...
<process>
```

Introducing BPEL4People

- White paper on BPEL4People
  - August 2005 from IBM and SAP
- BPEL4People and WS-HumanTask 1.0
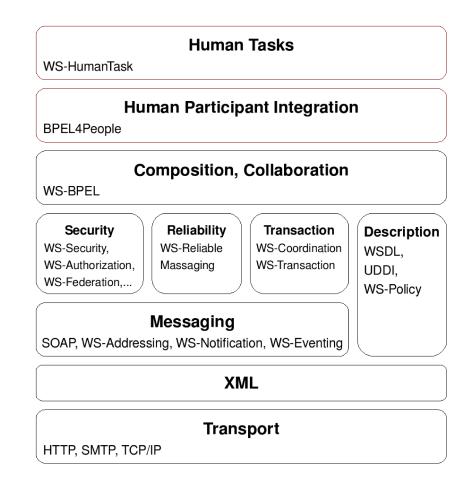 - released in June 2007 by various companies

A Web Service Stack

with

- BPEL4People
- WS-HumanTask

=> addressing integration of human aspects via BPEL extensions

Human Tasks
WS-HumanTask

Human Participant Integration
BPEL4People

Composition, Collaboration
WS-BPEL

Security	**Reliability**	**Transaction**	**Description**
WS-Security, WS-Authorization, WS-Federation,...	WS-Reliable Massaging	WS-Coordination WS-Transaction	WSDL, UDDI, WS-Policy

Messaging
SOAP, WS-Addressing, WS-Notification, WS-Eventing

XML

Transport
HTTP, SMTP, TCP/IP

Vienna BPEL for People (VieBOP)

- generic <u>BPEL4People system</u>
- manages <u>human aspects</u> of processes
  - realises BPEL4People concepts
- encapsulates traditional <u>BPEL engines</u>
  - that do not need to be extended for BPEL4People
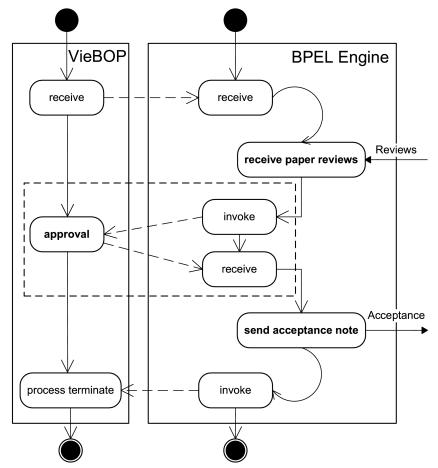- offers specific <u>interfaces to clients</u>
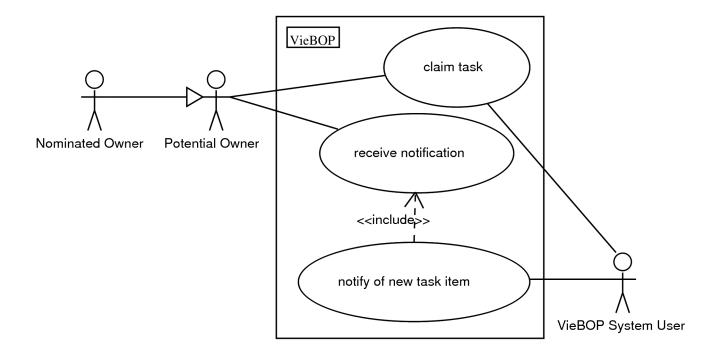
Mapping of BPEL4People to BPEL

- extracting
  BPEL4People
  specific data like **tasks**

- transforming
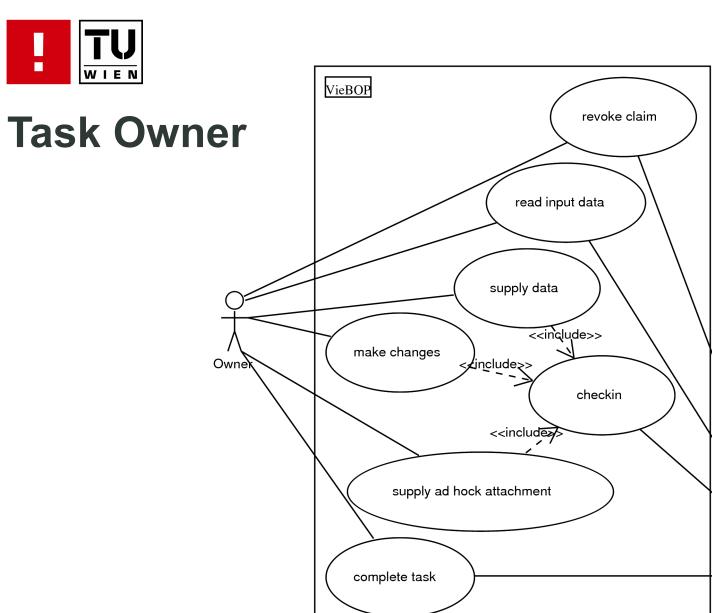 **peopleActivity**
  into a set of
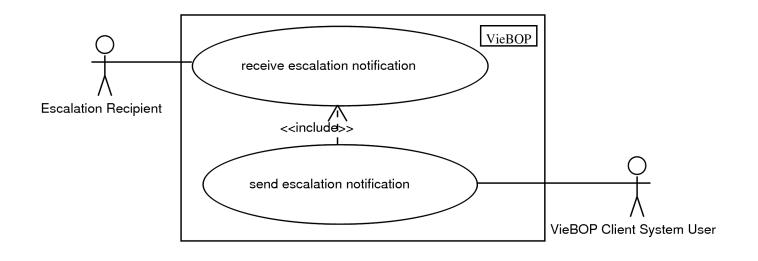 **invoke** and **receive**
  Activities

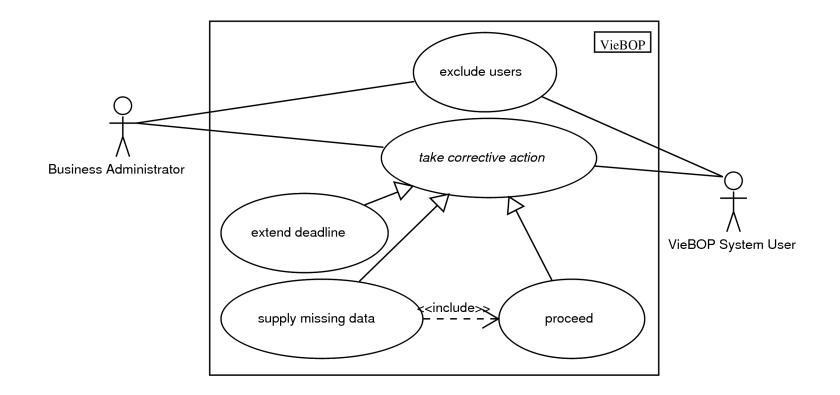# Nominiated & Potential Owner

Task Owner
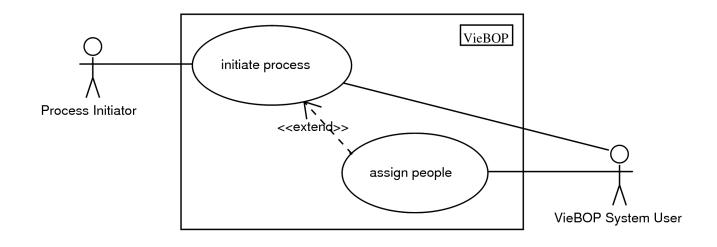
Escalation Recipient

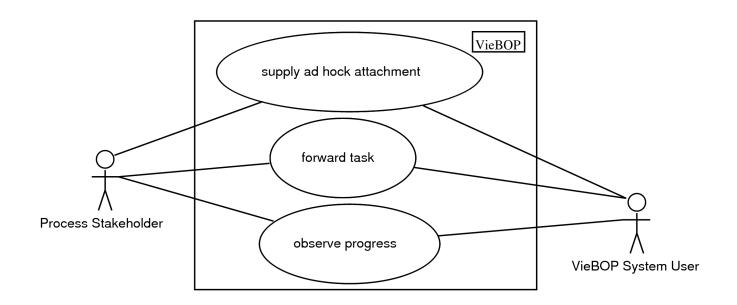# Business Administrator

Process Initiator

Process Stakeholder

Human ↔ Process Scenarios

- Nomination
  - an administrator nominates someone for ownership
- Four Eyes Principle
  - parallel execution of equal tasks by two independent parties
- Escalation
  - when time constraints have not been met
- Chained Execution
  - chained tasks are performed by the same owner; automatic (transactional) complete & claim of tasks
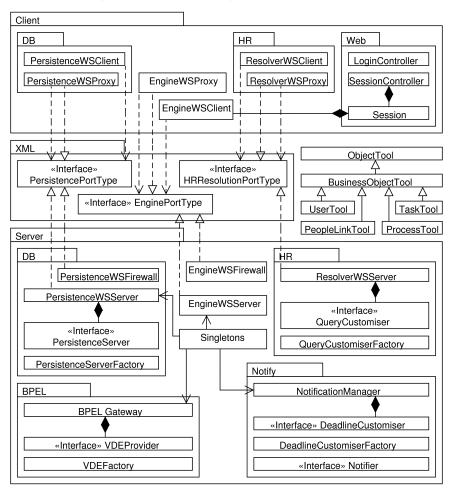
Goals for BPEL4People

Within the context of a business process BPEL4People must support

- role based interaction of people with processes,
- provide means of assigning users to roles,
- delegate ownership of a task to a person only,
- support of different scenarios

by extending BPEL

- with additional orthogonal syntax and semantics.

VieBOP: Package Diagramm

VieBOP component: BPEL Gateway

- deploys plain <u>BPEL</u> to an arbitrary BPEL engine via a VDE framework for validation, deployment and process execution

- <u>communicates with a process</u> instance via Web Service calls
  - exposes an endpoint
  - receives task invocation from BPEL engine
  - activates corresponding tasks
  - returns tasks results to BPEL engine

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VieBOP component: HR Service

- <u>hosts</u> human resource related information
- <u>offers</u> a Web Service to VieBOP
  - can be run individually by an organisation
- returns <u>user objects</u> for
  - user names
  - people links
  - successful logins
  - => hides the complexity of people links and queries
- <u>customisation</u> for people link resolution applicable
  - locality or other criteria may be applied

VieBOP component: Notification Manager

- <u>watches</u> deadlines

- <u>raises</u> escalations
  - creates and manages escalation tasks

- <u>subscription</u> to events possible
  - initialisation, (state) changes, completion

- <u>delivers</u> notifications
  - consults the HR service for people resolution
  - choose contact method (SMTP, SMS, WS)

Summary

VieBOP

- realises a "People" layer on top of BPEL
- hosts & manages people activities
- enables users to work with process instances
  - by submitting ad-hoc attachments
  - by performing tasks
- interacts with
  - users by sending out notifications
  - arbitrary BPEL engines

Further Work

- integrating conceptual models for describing human aspects of business processes within VieBOP
  - compliance to BPEL4People and WS-HumanTask standards via these conceptual models
- real world use case study
- support of user interfaces that are associated with tasks
- tracing techniques
  - metrics for human interactions

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Thanks for your attention!

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http://www.VitaLab.tuwien.ac.at

http://www.vitalab.tuwien.ac.at/prototypes/bpel4people